Supporting Information

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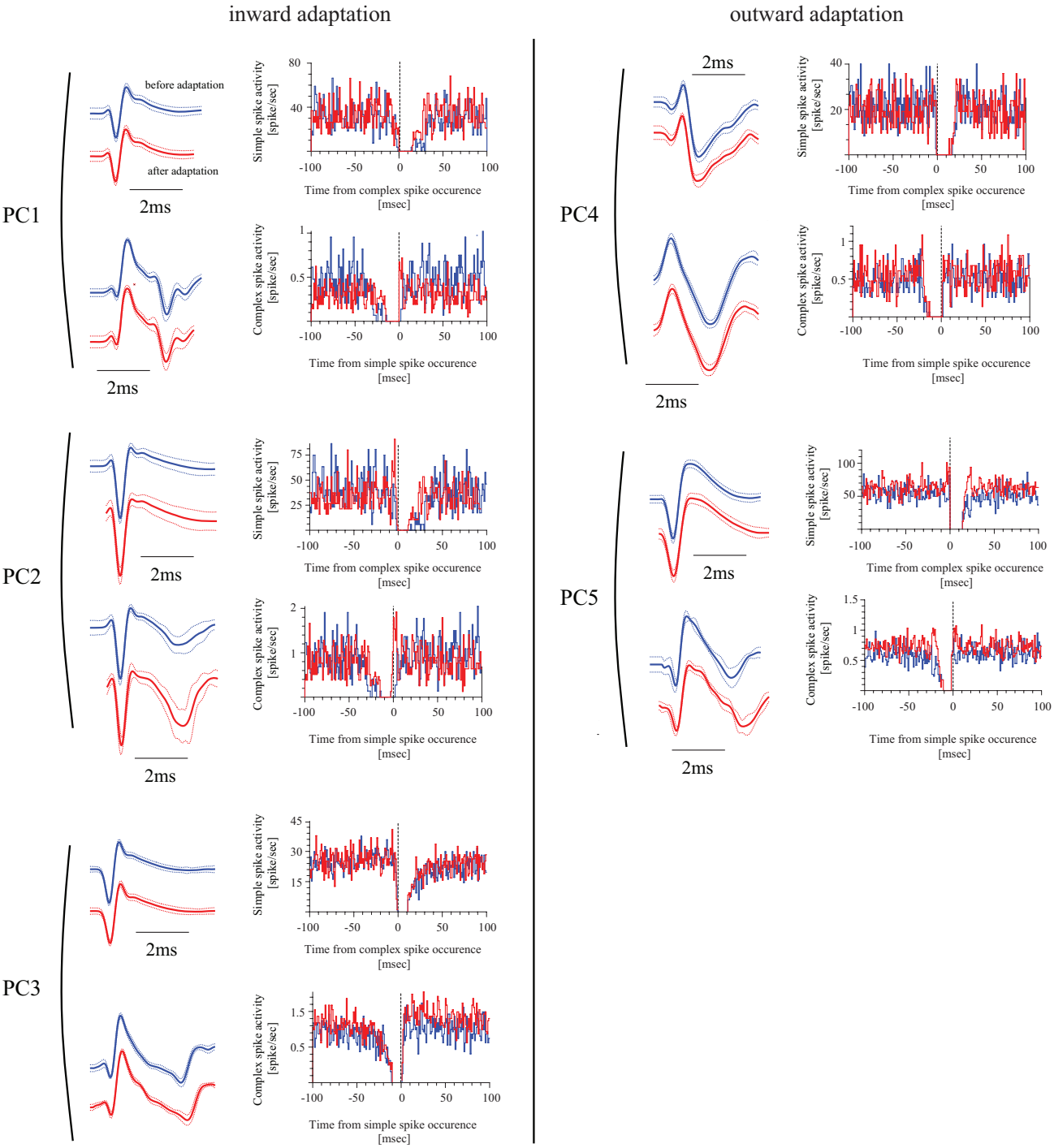

Fig. S1. SS and CS waveforms of the PC presented in Fig. 1, sampled before adaptation (blue) and after adaptation (red), respectively. The histograms depict either the CS-triggered averages of SS or the SS-triggered averages of CS before (blue curves) and after adaptation (red), respectively. The stability of the pause in either SS and CS induced by, respectively, CS and SS occurrence demonstrates the constancy of the recording as well as the absence of an influence of learning on the interaction between CS and SS. Due to a too small number of recording channels at the time of recording PC 6, we are unable to provide the waveform of PC6 as support of the stability of the recording. However, the evidence displayed in the ensuing Fig. S2 makes us confident that also in the case of PC 6, the recording was stable.

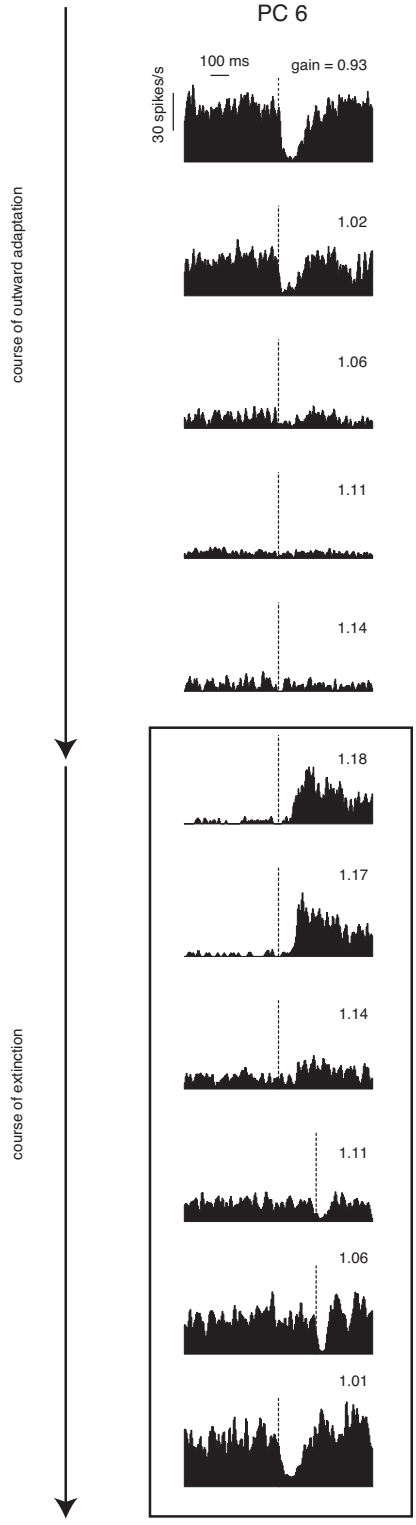

Fig. S2. PSTH of SS responses of PC 6 during outward adaptation and subsequent recovery from adaptation (extinction). After the extinction period, the neuron shows the same saccade-related pause as at the beginning of the recording session, speaking against the possibility that the dramatic change observed during learning might be a consequence of having inadvertently moved from one PC to another during the experiment. The format is the same as in Fig. 1.

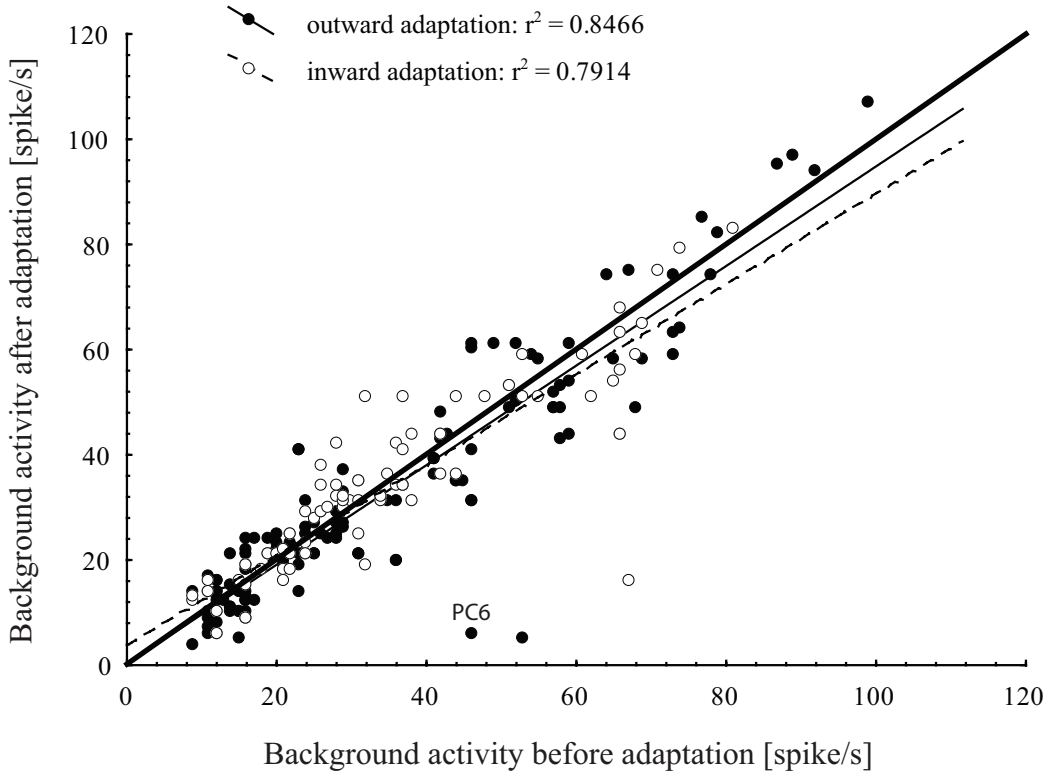

Fig. S3. Background activity before and after either inward (open circles) and outward adaptation (filled circles). Before adaptation, the background activities of the two populations of neurons were not significantly different (Mann–Whitney *U* test, $P > 0.1$). The background activities did not change as a consequence of learning (Wilcoxon test, $P > 0.05$; for both inward and outward adaptation).

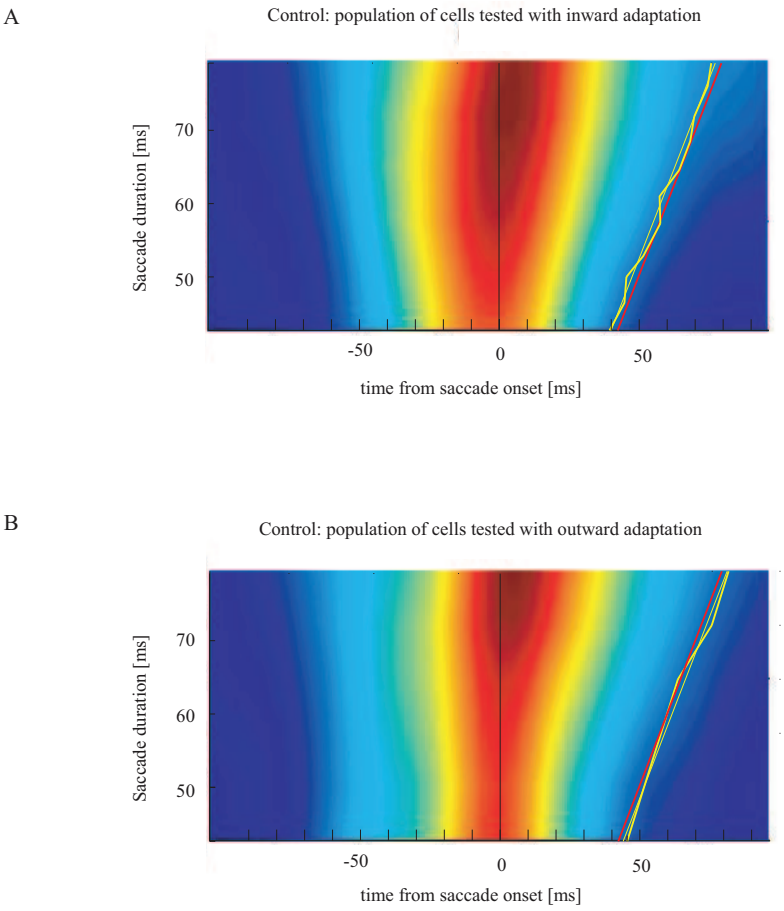

Fig. S4. Baseline SS population responses plotted separately for the two groups of PC subjected subsequently to inward adaptation (*A*) and outward adaptation (*B*) respectively. The red and yellow lines depict saccade offset and population burst offset, respectively.

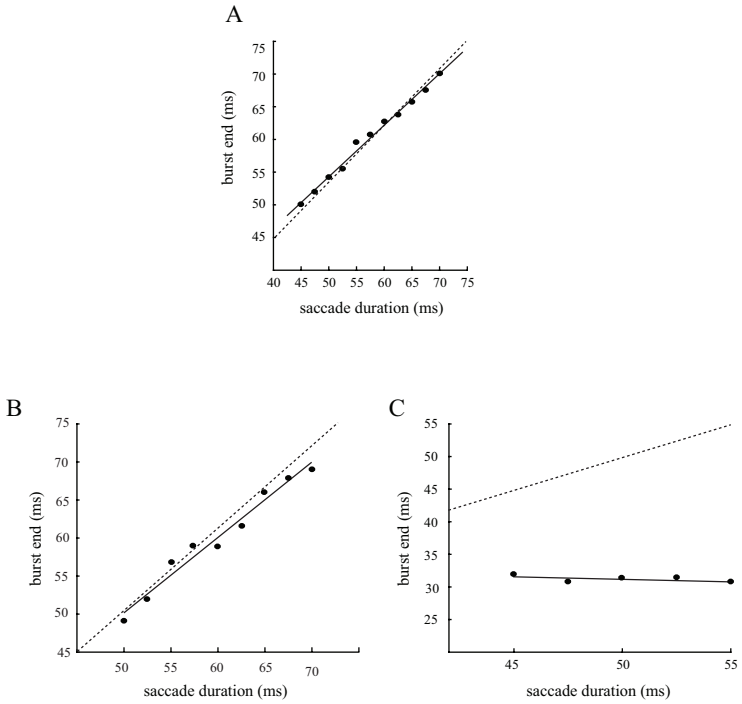

Fig. S5. Effect of STSA on PC PB. *A–C* depict the relation between saccade duration and time of the PB end, before, and after, respectively, outward and inward adaptation.

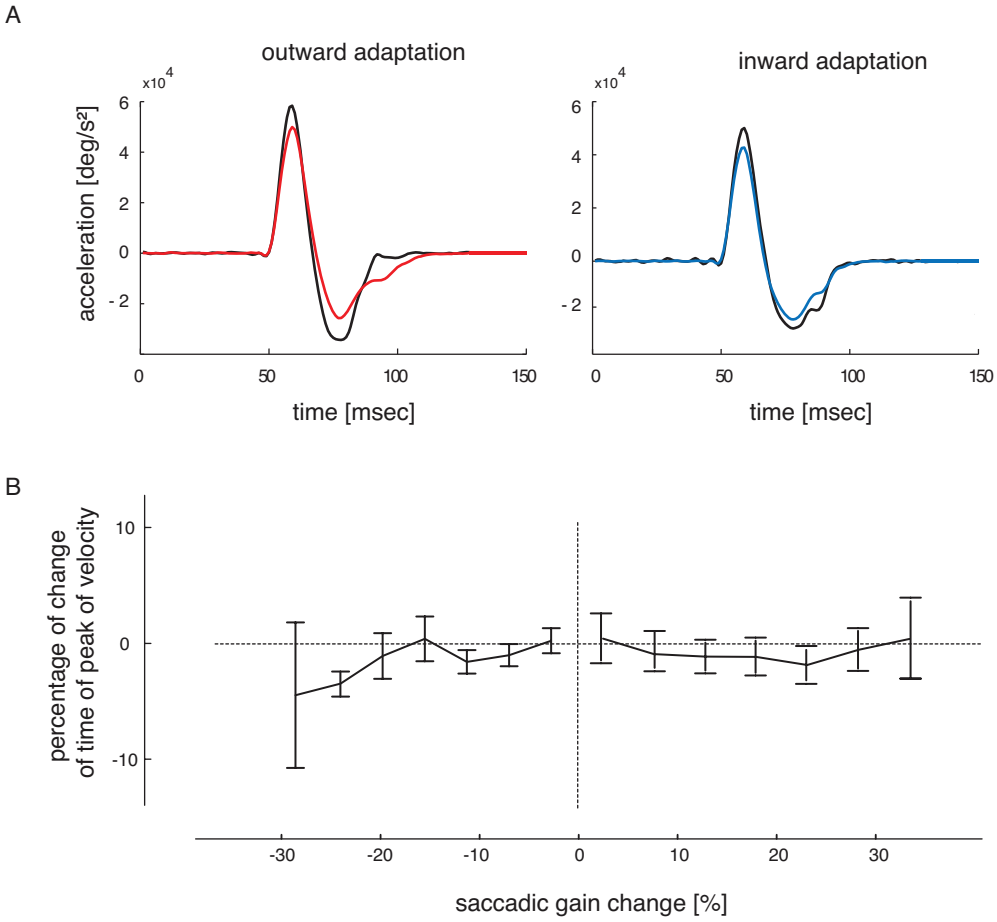

Fig. S6. Effect of STSA on saccade kinematics. (*A*) Example of eye acceleration of saccades collected before (black curves) and at the end (colored curves) of adaptation (from the same example presented in Fig. 4*A*). (*B*) Mean percentage of change of the time to peak velocity relative to saccade onset. Shown are the overall means ± SEM of all adaptation sessions (82 adaptations in two monkeys) needed to record the 212 neurons considered in the analysis.

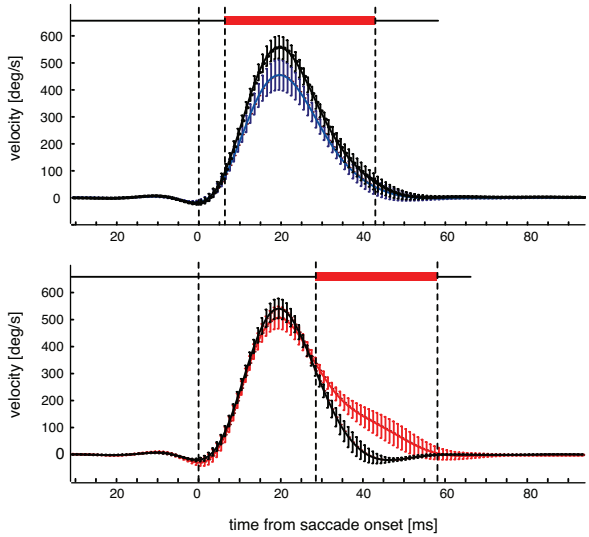

Fig. S7. Profile of PC PB. Mean velocity (± SE) profile of nonadapted 45 ms saccades (black) was compared with the mean velocity profile of adapted saccades after inward (blue) and outward (red) adaptation; the red bar above the profiles depicts the period when both profiles are significantly different (running paired *t* test, $P < 0.0005$, corrected for multiple comparison). As a consequence of full outward adaptation, saccade duration increased (on average from 45 to 58 ms). On the other hand, after inward adaptation, the saccade duration did not change.